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HOG CHOLERA

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WHAT IS HOG CHOLERA

Hog cholera is usually an acute disease of swine, but may be chronic. It is caused by a filterable virus and is characterized by a sudden onset, high temperature, extreme physical weakness, rapid spread through the herd, and high mortality.

HISTORY OF HOG CHOLERA

Hog cholera was first reported in the United States in 1833. Just how long it existed prior to this is not definitely known, but it is quite probable that it did occur before this time and was not reported, either because it was not definitely recognized or because the outbreaks were few. The early reports came from southern Ohio and Indiana. Hog cholera was next reported from the New England states. This would naturally be expected, since these two sections of the country were the chief hog raising centers at that time, and by trade and exchange of swine, the disease was likely to spread.

The disease then spread to those sections of the country where the larger number of swine were kept and it is now found in every state of the Union. The disease has caused the greatest losses in the states bordering the Mississippi, Missouri, and Ohio rivers and the Gulf of Mexico.

In Minnesota, hog cholera was first recognized in the early nineties and was reported as occurring in Watonwan and Nicollet counties. Only two counties in Minnesota have never had hog cholera within their borders. These are Lake and Cook counties. The greater number of cases of hog cholera have always been in the south half of the state because more hogs are produced in this territory. The years 1912, 1914, and 1915 mark the time of Minnesota's greatest epizootic of hog cholera. The estimated number of hogs lost from hog cholera in Minnesota for a period of twenty years is shown in Figure 1.

CAUSE OF HOG CHOLERA

Since the exact cause of hog cholera can not be definitely stated at this time, we say that it is caused by a filterable virus. By this we mean a substance, microörganism, or germ, which is so small that it will pass through the fine pores of certain filters (Fig. 2). Ordinary bacteria will not pass through these filters. The material that comes through when blood of a cholera hog is filtered, is capable of reproducing the disease. Stained preparations made from this filtrate do not reveal bacteria when examined with the most powerful microscopes, nor is it possible to cultivate or grow organisms on artificial culture media in the laboratory. Because of these facts the diagnosis of this disease is difficult.

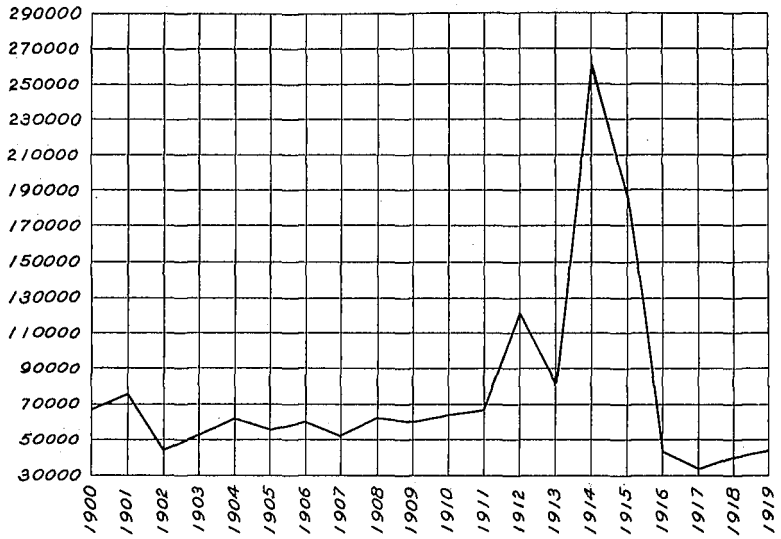

Fig. 1. Number of Hogs Lost from Hog Cholera in Minnesota

To obtain a pure virus requires a considerable amount of time. Fresh blood, urine, and the juices from macerated tissues of an affected pig contain the virus. The most available source of virus is the blood. The material to be filtered is placed around the filter candle in the glass mantle. To hasten the process of filtration, one of two methods is used. If the suction or vacuum method is employed, the material will be drawn or pulled through the pores of the candle, and if pressure is used it will be forced or pushed through. This proves that the causative factor of hog cholera must be very small, since if a susceptible pig is injected with some of the material that comes through the filter, it will sicken and die from hog cholera. Such germs as cause tuberculosis, anthrax, black leg, or typhoid fever, will not pass through similar candles.

The discovery that the causative factor of hog cholera was a filterable virus was made by Dorset, McBryde, and Bolton, of the United States Department of Agriculture, in 1905. Previous to this, Salmon and Smith, in 1885, reported that hog cholera was caused by a germ known as *Bacillus suipestifer*. They isolated this germ from pigs affected with cholera. This organism is frequently found in cases of hog cholera, but is now considered as a secondary invader, or an associated microörganism. However, it, with others, may complicate matters when making a diagnosis and applying effective treatment.

In 1913, King and Baeslack reported the finding of a peculiar spiral-shaped organism in the blood of cholera pigs, which they called *Spirochetae hyos*. For a time they were quite enthusiastic over their discovery and thought it was the specific cause of hog cholera. Again, in 1917, Proescher and Siel discovered small round organisms occurring in pairs which they thought were the cause of the disease. They reported as having found this germ in the blood and urine of infected hogs.

From time to time other claims for the discovery of the true cause of hog cholera will probably be announced and no doubt some one in the future will find the cause of this disease. Until that time, however, the fact that the causative agent is a filterable virus is all that is definitely known concerning it.

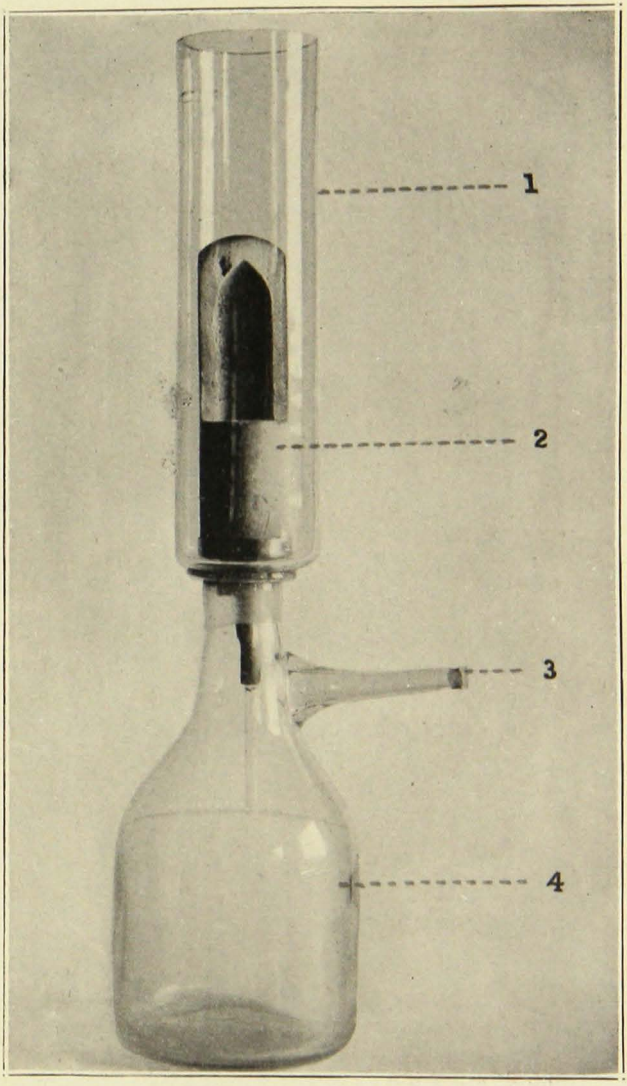

Fig. 2. Filter

1. Glass mantle surrounding filter candle
2. Filter candle (cut to show its structure)
3. Connecting arm (for attachment to suction or vacuum pump)
4. Flask (for collecting the filtrate)

The material to be filtered is placed in the glass mantle and around the filter candle. Then all the air is drawn from the flask by the vacuum pump. This causes a drawing or pulling effect upon the material in the mantle with the result that some of the material comes through the fine pores of the filter candle and is collected in the flask.

ANIMALS SUSCEPTIBLE TO HOG CHOLERA

The hog is the only animal that is susceptible to hog cholera. Horses, cows, sheep, dogs, cats, poultry, pigeons, rabbits, mice, and guinea pigs have been inoculated with the virus of this disease, but have always been found immune. Man is also immune. At one time it was thought that "mule-footed" or single-toed swine were immune to hog cholera, but this is not true.

FORMS AND TYPES OF HOG CHOLERA

It is recognized that hog cholera exists in more than one form and type. By form we mean that the disease assumes certain characteristics according to the part or organ of the body affected. The forms of the disease recognized are: Bowel form, when the stomach and intestines are affected; lung form, when the lungs are affected; skin form, when the skin is affected; septicemic form, when the blood is principally involved; and the mixed form when any two or more of the above forms are present. The mixed form is by far the most common and the one most often recognized.

The type is determined by the length of time that the disease is in progress. Types seen are: peracute, acute, subacute, and chronic. In the acute type the pigs show symptoms for two or three days before death, while in the peracute, they are sick a much shorter time. In the subacute type the pigs live a little longer than in the acute (from three to eight days). In the chronic type the animals may live for a considerable length of time (from eight days to three weeks). No definite line can be drawn that will distinguish one type from another, since they may merge. It is not uncommon to find all types and two or more forms of the disease in a herd of hogs sick with hog cholera.

SYMPTOMS OF HOG CHOLERA

Usually the first sign or symptom noticed will be one or more pigs "off feed." They may come to the trough but only nibble at their food and then turn away. By the next feeding time, they have lost their appetite, but drink great quantities of water if it is available. Often a sick pig will not get up and come to feed and frequently will not rouse until forced to and then it will move off a little way and stand with its flanks tucked up. The head is allowed to droop, the ears droop, and the tail hangs limp. The hair coat becomes rough and shabby in appearance.

Great muscular weakness is shown by a wabbling and staggering gait. The hind parts sway from one side to the other. The animals stand with their hind legs crossed and sway from side to side. A peculiar jerking of the head may be seen. They frequently stand with their backs arched and their feet drawn close together under them, so that the feet come nearer the center of the body and then the animal sways from side to side or frontward and backward.

The temperature of a hog affected with cholera is high. It is not uncommon to find a temperature of 108 degrees F. in an affected pig. More often, however, the temperature varies between 104.5 and 107.8 degrees F. The fever will usually last from four to seven days and even longer in some instances. After the crisis of the disease when death is coming on, the temperature will go down, frequently below normal. The normal temperature of a pig varies between 100.8 and 102.2 degrees F. A pig should not be chased about before inserting the thermometer, as the exercise may have a marked influence on the temperature. The temperature of pigs in the chronic stages of cholera may not be above normal. Daily temperatures taken of such pigs will give a curve showing frequent raises and then drops back to normal. Temperatures taken of pigs in the incubative stages of cholera will show a gradual rise.

Diarrhea is a usual symptom of hog cholera, but it is not necessary to have diarrhea present before one should suspect cholera. During the course of the disease, constipation alternating with diarrhea is frequently found. The diarrheal excretion is often dark in color, very watery in consistency, and has a very disagreeable odor. Often we can recognize whether diarrhea is present by the fecal matting and staining of the tail and buttocks.

In many cases a cough will be noted. The cough is usually dry and hacking. It is a result of an inflammation of the pharynx (throat), larynx (voice box), or more often of the bronchii and bronchioles (air tubes) in the lungs. This symptom is seen more often in young pigs and shoats than in older hogs. Coughing is not strikingly characteristic of hog cholera.

It also frequently happens that many hogs die before any particular cholera symptoms are noticed. These are usually affected with the septicemic form and the peracute type of the disease.

Post-Mortem Lesions of Hog Cholera

The proper time to make a post-mortem examination, or autopsy, of a carcass is as soon after the animal dies as possible. A hog, especially a fat one, will decompose very rapidly. It is absolutely useless to make deductions concerning the post-mortem findings on a carcass that has decomposed. Decomposition takes place most rapidly in the summer and fall. It is also difficult to perform an autopsy on a carcass that has frozen solid. Frozen carcasses should be allowed to thaw out.

A certain definite system should be followed when performing an autopsy on a carcass in order that none of the tissues or organs will be overlooked. Some of the abdominal organs should be removed and put aside to be inspected last. This will prevent stomach and intestines from obstructing the view of other abdominal organs and will facilitate the inspection of them.

Methods of Procedure.—The carcass should be removed to a place preferably outside the hog lots. Before making any incisions examine the carcass for external lesions. Note if there are any discolorations of the skin, nasal secretions, or matty and gummy excretions about the eyes. Note whether the tail and buttocks are soiled with fecal matter.

The carcass should be lying on its side or back. To open the carcass for inspection, it is preferable to make a deep incision in the region of the arm pits, cutting close to the ribs and deep enough to separate the shoulder from the body without cutting through the skin at the withers. If this is done properly both front legs will lie out flat on the ground. Next, separate the hind legs in a like manner. This is done by starting the incision between the legs, and cutting forward and outward close to the abdominal wall, then cutting through the fold of the flank. When this is done, a joint between the pelvis and leg is seen, and this can be separated with a knife. By this time the carcass should lie quite firmly on its back so that it will not roll over.

Next, an incision should be made in the midline of the body from the throat to the hind legs, cutting down to the ribs of the thorax and through the walls of the abdomen. An easy way to open the thorax is to cut from behind forward and about one inch from the midline or center of the body. Then cut between the first and second ribs to the backbone. Now the diaphragm, or muscular partition between the liver and lungs, should be cut. Then by putting pressure on the ends of the ribs you can break them outward.

Fig. 3. Spleen from a Case of Hog Cholera

This shows numerous dark, soft, and raised areas along the borders and on the surface of the organ.

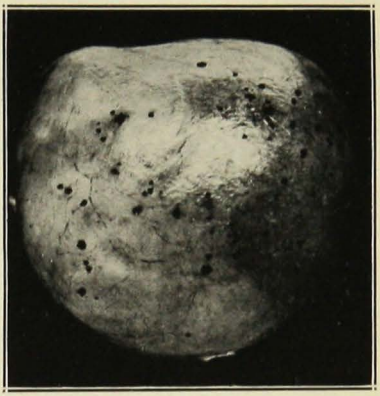

Fig. 4. Bladder from a Case of Hog Cholera

The bladder has been turned inside out. Note the spots scattered over the mucous membrane or lining.

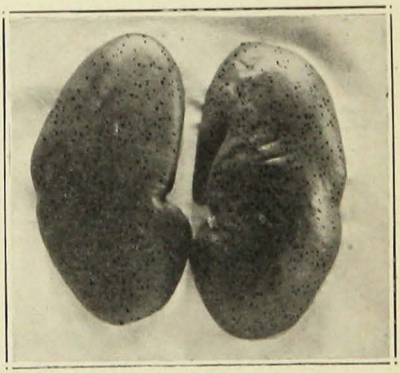

Fig. 5. Kidneys from a Cholera Carcass

The outer capsule has been removed and the small pin-point hemorrhages which appear as specks are characteristic of hog cholera.

One should now remove the spleen. Then carefully remove the stomach and intestines and put them to one side for examination later. From this stage it is comparatively easy to examine any tissue or organ desired. A description of the lesions noted in cases of cholera and in the order in which the organs are removed for examination follows.

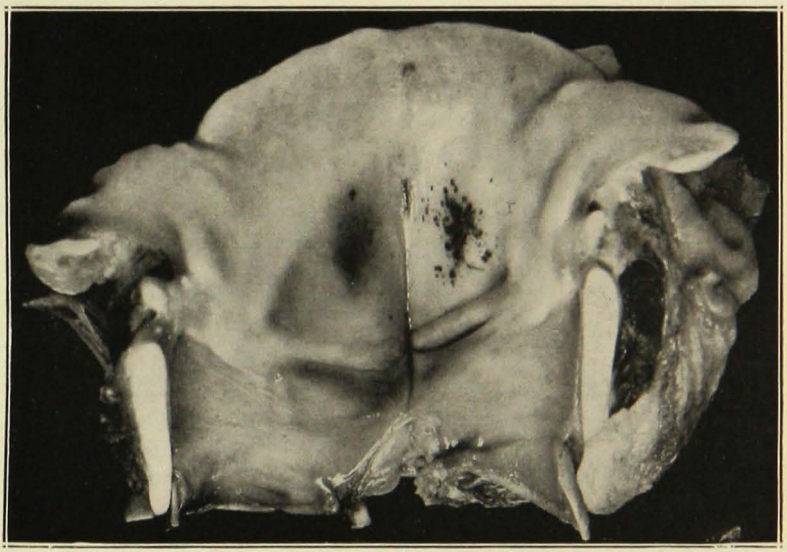

Fig. 6. Piece of the Larynx from a Cholera Carcass

The larynx is cut and spread so that the inner surface is clearly visible. The hemorrhagic spots are readily discernible.

Spleen.—This organ is unusually dark in color and soft in acute cases of hog cholera. Frequently dark and soft areas from about the size of a nickel to that of a dollar are raised above the surface. In chronic cases the spleen is often very small, and gray in color.

Bladder.—To examine the bladder for characteristic lesions, it is necessary to open it and inspect the mucous membrane or inner lining. Usually small red spots will be found on this membrane that will not rub or wash off.

Kidneys.—In order properly to inspect the kidneys the outer thin membrane or capsule must be removed. Small red spots usually show on the surface. In some cases these may be few in number while in others the surface is covered with them. The common expression of "turkey-egged" kidney comes from the fact that the surface is covered with these specks. If the kidney is cut through, similar spots are often found near the outer edge.

Liver.—No lesions that are particularly characteristic of cholera can be recognized in the liver.

Heart.—The heart, like the liver, does not show signs that are definitely characteristic in all cases of cholera. However, certain lesions, such as hemorrhagic areas (blood spots) on the outer surfaces of the heart and similar ones on the inner walls are recognized in acute cases of cholera.

Fig. 7. Portion of Large Intestine from a Case of Hog Cholera

Note the roundish, crust-like ulcerous formations on the mucous membrane or lining of the bowel. Because of their button-like appearance they are known as "button ulcers."

Lungs.—Hemorrhagic spots in the form of small blotches are seen on the outer surface of the lungs. Another lesion that is quite frequent involves a small section of the lung known as a lobule. The lobule, or it may be several of them, is completely collapsed and dark red to purplish in color. These lesions are most frequently seen in the lower portions of the lungs.

Larynx.—The larynx is the organ at the beginning of the windpipe, or trachea, and opens into the throat. This should be cut out and opened lengthwise. On the mucous or inner surface, small red spots which resemble rust specks may be seen.

Lymph glands.—The lymph glands are small lymphoid structures, widely distributed in the body. They vary greatly in size, and in shape are more or less like a bean or kidney. Those which are of most interest to us and are accessible are in relation to the lungs, liver, stomach, small intestine, and in the region of the groin. In affected carcasses these are swollen and hemorrhagic. They should be cut open. The cut surface shows that the hemorrhagic portion is toward the outer edge of the gland. In appearance an affected gland resembles the cut surface of a strawberry.

Stomach and intestines.—The lining of the stomach and small intestine usually does not show more than a slight reddening. Sometimes the outer coat of the small intestine shows numerous bright red spots. In other instances, numerous small red spots can be seen in the mucous lining of the intestines, particularly in the large intestine. In the caecum and large intestine ulcers are often found. These appear as raised yellowish brown, yellowish red or dirty yellow flaky, crust-like formations and are usually round. They are especially noticed at or near the "ileo-caecal valve." This is where the small intestine enters the large intestine or caecum. These ulcers vary in size from that of a pea to about that of a twenty-five cent piece or a little larger.

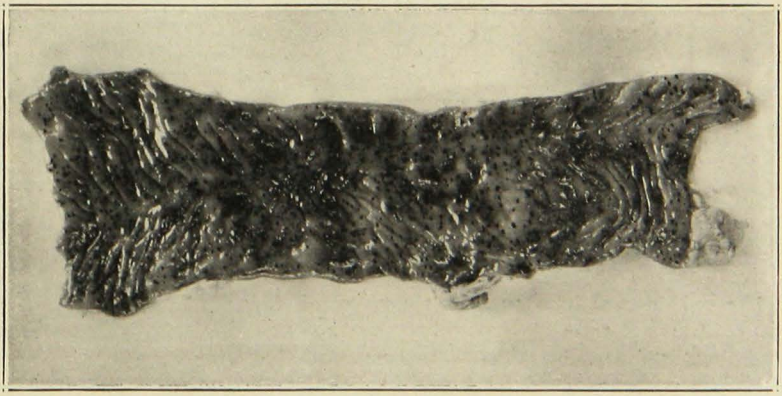

Fig. 8. Portion of Small Intestine from a Case of Hog Cholera
This shows many small hemorrhagic spots in the mucous membrane or lining.

DISPOSITION OF THE CARCASS

It is highly important that the carcass be disposed of so that the chances of cholera being spread by dogs, foxes, birds, etc., are eliminated. Burning is the most satisfactory method of disposition and a swine carcass will burn readily. The proper way to burn a carcass is to place it on top of the fire and not, as has

been done, by piling the wood on the carcass. If the entire carcass is not burned at the first burning, the operation must be repeated. Burial is satisfactory providing the carcass is put at least four feet under ground and quicklime is scattered over it. Dogs will readily dig out one that is not buried deep and this is almost as bad as not attempting to bury the carcass at all. To throw carcasses in an old ditch, sink-hole, stream, or river is criminal and is a misdemeanor. Such practice will assist in the further spread of the disease. The hauling of dead cholera hogs over a public highway in other than water-tight receptacles is a fertile source of infection and is prohibited by law.

DIAGNOSIS OF HOG CHOLERA

In making a diagnosis of hog cholera, all the above features concerning the symptoms and post-mortem findings must be taken into account. It must be remembered that in every case of hog cholera all these features may not be present, and when variations do occur they make the diagnosis more difficult.

Conditions and circumstances are altered in many cases so that the symptoms and post-mortem lesions are not sufficient to permit a positive diagnosis. Therefore additional facts must be taken into consideration; i.e., the length of time the disease has been in progress in the herd; the number of animals affected; whether cholera has existed on the premises before; whether any new stock has been introduced into the herd recently, if so, from what source; whether any of them have been immunized by the serum-virus method, if so, how long ago; and whether cholera is present in the vicinity. A correct understanding of such facts coupled with symptoms and lesions suggestive of cholera, serves to establish a diagnosis. Even after all these things have been taken into consideration, doubt as to the proper diagnosis may exist. In order to clear this doubt, there is only one way possible, and that is by animal inoculation.

To do this, a sample of blood from the doubtful case must be obtained and brought to the laboratory. Here it must be filtered and the filtrate injected into susceptible pigs. If hog cholera is present, the inoculated pigs will begin to show symptoms from the fifth to the twelfth day and should die from the tenth to the twenty-first day. Then, if the autopsy shows changes characteristic of hog cholera, the diagnosis would be made. This, however, is a long procedure and is costly because if we must wait from ten to twenty-one days before a diagnosis is made, the animals in the affected herd may all be dead or be in such a weakened condition that serum would be almost worthless.

METHODS OF TREATMENT AND PREVENTION

The **only** successful agent for the checking of this disease and for preventing further outbreaks is anti-hog cholera serum. This is a biological product prepared from hogs that have been made hyperimmune to hog cholera virus. The purpose of injecting anti-hog cholera serum is to render an individual immune to the disease.

It should be understood at this time that anti-hog cholera serum is not a cure for the cholera, but is a preventive. However, we recognize that anti-hog cholera serum seems to have a curative action upon many pigs in the early stages of the disease.

There are two well-recognized methods of use for anti-hog cholera serum. These are known as the serum, serum alone, serum only, or single treatment; and the serum-virus, simultaneous, or double treatment.

The serum, serum alone, serum only, or single treatment consists of just what these names imply, namely, the injection of the anti-hog cholera serum only.

The object of this treatment is to put into the animal's body a substance that will attack or hold in check the causative factor of hog cholera, thus preventing the animal from becoming sick from this cause. Animals so treated are spoken of as having a passive immunity. An immunity of this kind is not lasting and will usually run out in from three to six weeks.

This method of treatment is applicable under such circumstances as when cholera breaks out in the herd and it is necessary to try to check it as soon as possible. All the pigs should be treated except possibly those that are in the advanced stages of the disease. Neighbors whose hogs are likely to contract the disease can immunize their pigs in this way and prevent the disease from breaking out in their herds. However, the serum-virus method is preferable under these circumstances. Pregnant sows can be treated with serum alone without detrimental effects to them or to their offspring. If cholera is rampant on the farm when pigs are being farrowed by non-immune sows, and the disease starts among the young pigs, they should be treated with serum immediately. The serum treatment should be administered to any newly purchased animals unless it is known that the individuals in question have been immunized to cholera.

The serum-virus, simultaneous, or double treatment involves the introduction of some of the virulent blood at the same time as the serum. Hogs so treated, if the work is properly done, are immune to cholera as long as they live.

The best time to treat pigs by this method is when they weigh between forty and sixty pounds and are in good health. Smaller pigs may be treated in this way. There is no maximum weight at which hogs can be treated. Occasionally some pigs die of cholera as the result of the serum-virus treatment, but these cases are less than 2 per cent of the total number treated. There are several advantages in treating pigs of from forty to sixty pounds in weight—they are more easily handled, less serum is needed, and if one dies the economic loss is not so great as with heavier hogs.

If the serum-virus method is used on non-infected premises, one is quite likely to introduce hog cholera, because when a pig is treated with serum-virus hog cholera blood is introduced into the body, and it is known that such pigs have a mild form of the disease and often pass off virulent material in the normal excretions and secretions of the body. For this reason, double-treated pigs and susceptible pigs should not be put together until at least twenty-one days after treatment. A longer time, obviously, is preferable.

Methods of Administering Serum

It is preferable not to have the pigs that are to be treated on full feed. Pens should be provided where pigs will neither be too crowded, nor have too much room to move about. This facilitates catching and prevents too much excitement and motion, with consequent exhaustion. The floor of the pen should be free from dust and preferably covered with shavings or straw. After a pig has been treated, it should not be allowed to run in a muddy or dusty pen for at least twenty-four hours. This will tend to prevent such germs as might cause abscesses or sloughing from entering the wound made by the hypodermic needle.

The point on the body where the injection is to be made is a matter of selection by the operator. There are four principal places where the serum can be injected conveniently. These are: (1) on the inside surface of the ham; (2) in the arm-pit or between the front leg and the chest wall; (3) behind the ear; (4) in the fold of the flank. The first two locations are best for pigs weighing up to 150 pounds, and the latter for heavier hogs, pregnant sows, and large boars.

For injecting in the ham of pigs weighing up to 90 pounds, grasp the pig by the hind legs and hold him head down, place the pig's rump in your groin, his back between your legs, and with your knees press against the pig's shoulders. If you wish to inject in the arm-pit, hold him up by the front feet, place the back of his head in your groin, his back between your legs, and with your knees press against his hips. Pigs weighing from 90 to 150 pounds should be placed on the back, either on the ground or in a trough, and held by two assistants. The trough can be placed on a trestle about three feet from the ground in a horizontal position. Another convenient way is to have the trough placed in an inclined position, and if the operator chooses the ham as the site of injection, the head end of the pig should be down. If the arm-pit is chosen, the head end should be up. To inject behind the ear, put a rope around the upper jaw and behind the tusks and then tie the free end to a post or fence. The hog will usually pull back on this rope and in this way secures himself quite firmly. The injection into the fold of the flank can also be made by restraining the animal in this way.

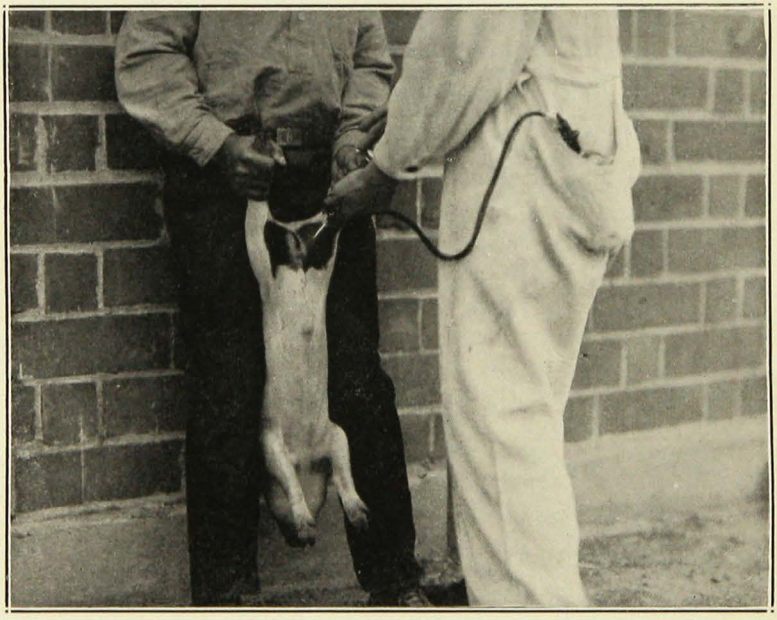

Fig. 9. Method of Restraint and Site of Inoculation for Injecting into the Inner Surface of the Ham

At the point where the injection is to be made, the skin should be thoroly cleansed with soap and water, and all excess soap and water wiped off. Any of the coal tar disinfectants in 2 per cent solution, denatured alcohol, or tincture of iodine can be used for disinfecting the point of injection. Tincture of iodine is an excellent agent as it will serve two good purposes: (1) It is a good antiseptic and disinfectant and (2) it stains the tissues and will serve as an identification mark. If one of the treated pigs should get

among the untreated ones, the stain would disclose its identity. The pig should be freed of restraint as soon after injection as possible. This will allow the skin to close over the needle puncture and thus prevent leakage of serum.

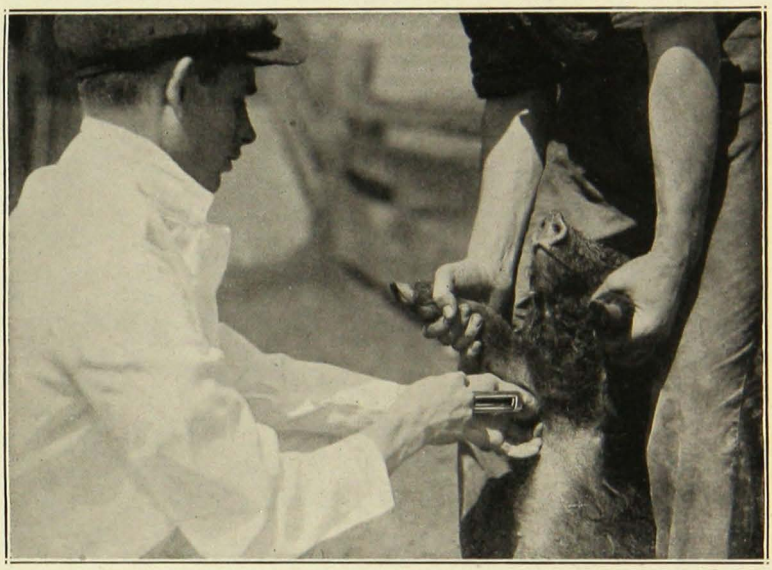

Fig. 10. Method of Restraint and Site of Inoculation for Injecting into the Arm-pit

ANTI-HOG CHOLERA SERUM

The progress in the production of anti-hog cholera serum has been rapid. Its value as a preventive agent against hog cholera has been tried and proved many times. Skepticism and doubt regarding its value should be abandoned. It has long passed the experimental stage and has become an article of known value. Nevertheless, investigations and research are constantly being carried on in the attempt to improve it.

Hog cholera serum was discovered less than twenty years ago by Doctors Dorset, McBryde, and Niles, of the United States Department of Agriculture. These men are still active in the furtherance of the work and have done much toward the improvement of the serum.

In order to produce anti-hog cholera serum, it is necessary to secure an immune pig, one that will not contract the disease, no matter how severely it is subjected to the virus or causative agent of cholera. By injecting this immune pig with large quantities of a virulent hog cholera virus, it is made hyperimmune, or more than immune. Blood extracted from a properly prepared hyperimmune pig will contain enough anti-hog cholera substance or anti-bodies, to protect a susceptible pig if injected in sufficient dosage. Therefore the blood obtained from the hyperimmune constitutes what is known as anti-hog cholera serum, or hog cholera vaccine. The latter term is a misnomer and should be discarded.

The product obtained in this way is virtually whole blood. Certain technical steps are necessary to remove the fibrin or clot from the blood,

and a preservative is added. This product, which has all the outward appearances of whole blood, is known as "bloody" serum, and is not a sterile product. It is the only kind that was used for several years and great quantities of it are being used at present. However, in recent years a clear, sterile serum was perfected which differs from the bloody serum in that all of the blood corpuscles or cells are removed and the product is freed from living organisms. To accomplish this requires a considerable amount of extra work, thus causing additional expense in its manufacture. This product is gradually taking the place of the old bloody serum and promises to be a cleaner and safer product to use.

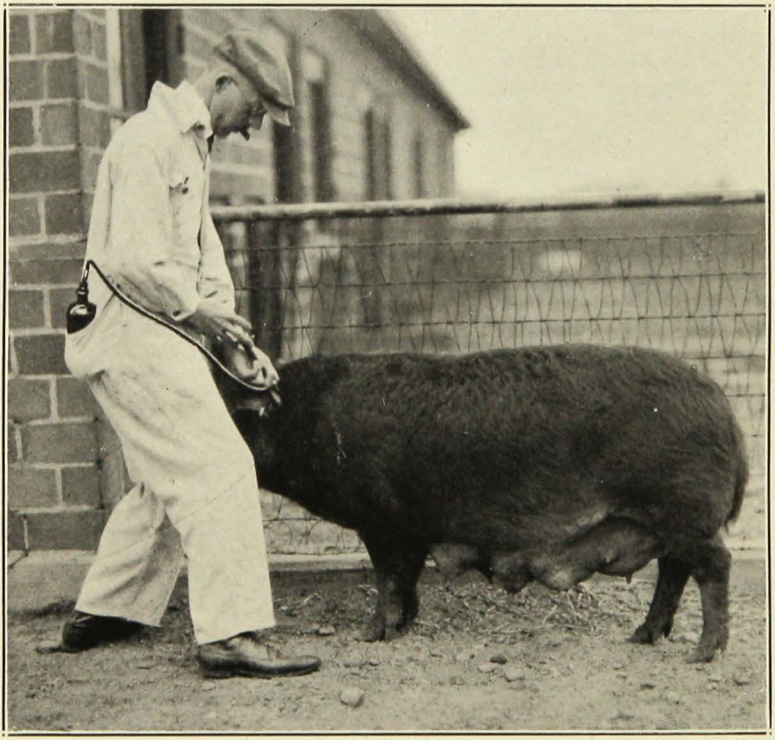

Fig. 11. Method of Restraint and Site of Inoculation for Injecting Behind the Ear

WILL HOG CHOLERA SERUM INFLUENCE BREED CHARACTERISTICS OR POTENCY?

This question is one of special interest to breeders of purebred swine. Many have been backward about using anti-hog cholera serum because they feared it might influence characteristics in the offspring of serum-treated hogs. Again, others believe that serum-treated sows produce small litters and pigs with weak constitutions.

The answer to this question is **NO.**

The reason for this answer may be briefly stated by saying that individual characteristics are transmitted from parent to offspring only through germ cells. Blood cells and serum are not germ cells and therefore can not influence such

characters. Serum and virus treatment will not cause the sow to farrow a small litter. Sows that are serum-virus treated during the latter half of pregnancy often abort or give birth to weak or even undeveloped young. The apparent cause of this is that the sow passed through a mild attack of cholera following immunization and certain inflammatory processes occurred in the uterus.

CONTROL OF HOG CHOLERA

The eradication of hog cholera is the ultimate object. Just how soon the time will come, or whether it will ever come, that hog cholera will be entirely eliminated, no one knows. However, in the light of what is being done with certain other diseases of livestock, as tuberculosis, dourine, foot and mouth disease, and Texas fever, it would seem that hog cholera could be dealt with in a similar manner. In order to do this, the honest and whole hearted coöperation of the federal and state authorities, the veterinarian, the county agent, and the hog raiser himself, is needed.

One of the most important steps in the control of hog cholera is the early diagnosis or recognition of the disease. A correct diagnosis is imperative. As soon as any of the pigs appear sick, a veterinarian should be called, and with him rests the responsibility of a proper diagnosis and the method of procedure to follow. If anti-hog cholera serum is used on swine suffering from some disease other than hog cholera, the results are discouraging.

In outbreaks of hog cholera, anti-hog cholera serum can not be used too soon. Attention is again called to the fact that serum is not a cure but it may be given in large doses to swine in the early stages of the disease. It should be remembered that if only one hog is saved, it will pay for the serum used.

Sanitary measures are equally as important in the control of this disease as is the use of serum. In the first place all sick swine should be removed from the herd and put in a separate pen or enclosure. These animals are extremely dangerous in the herd, since they are the greatest source of infection and are active spreaders of the disease. All dead carcasses should be removed from the pens or pastures and disposed of by burning or by deep burial.

Hog houses should be thoroly cleaned and disinfected. To do a good job requires a considerable amount of effort, but the cost in dollars and cents will be more than compensated. All straw, litter, etc., should be burned or plowed under in a field that will not be used for hog pasture for at least three years. It is important to get all the filth out of the corners and cracks, and also the dried accumulations from the walls, troughs, gates, etc. After all manual cleaning has been done, apply a disinfectant. (See following paragraph.) The feeding troughs and floors should be washed clean of all foodstuffs, etc., and then scalded and exposed to direct sunlight as long as possible. Drinking fountains should be treated in like manner. The litter and muck in the pens and runways should be collected and hauled away. This will allow the sun's rays to reach the surface. The sun is one of nature's most powerful disinfectants. The disinfected pens, etc., should be allowed to dry thoroly before fresh bedding and hogs are put into them.

A disinfectant is a product that destroys disease germs or renders them harmless. The causative agent of hog cholera is more or less resistant to certain disinfectants, and therefore only those that will destroy this virus should be employed. Carbolic acid, because of its poisonous properties, is not considered a good disinfectant for this purpose. It is also expensive. Cresol or compound solution of cresol, is more effective. A 2 per cent solution of either when made up with warm soft water and applied liberally, serves the purpose admirably.

Most of the commercial disinfectants made from coal tar acids are suitable and can be used. Milk of lime, made by thoroly mixing one part of recently slaked quick-lime and four parts of water is very useful and beneficial.

Dogs, cats, crows, hawks, buzzards, pigeons, birds, and even flies will spread hog cholera. It is very difficult and next to impossible to control all these agencies. One may, however, by observing the sanitary and control measures already mentioned, reduce to a minimum the danger from such sources.

To further the work toward the control of hog cholera, a quarantine should be established. The very name quarantine usually is repulsive. Some seem to think that to have their hogs quarantined is cause for shame. As a matter of fact it is just the opposite, because the person who has cholera on his farm and does not make it known or resents the quarantine, is the one that should be ashamed. The man who displays a placard on his farm announcing the presence of cholera and lives up to the regulation of the quarantine, is doing his bit to control the scourge.

Fig. 12. Hog Cholera Carcasses Piled in an Open Field
A good chance for dogs, crows, buzzards, etc., to carry about the infection.

By an act of the legislature of 1919, amended in 1921, provision was made whereby hogs can be immunized by the serum-virus method within a radius of six miles from infected premises. This territory or zone is regarded as infected territory. Qualified licensed veterinarians may administer virus to hogs in infected territory after receiving a permit from the State Live Stock Sanitary Board. The act also provides that such treated swine shall be properly quarantined for a period of at least twenty-one (21) days, or more if so-called vaccination cholera or other contagious disease appears. A special placard, such as that shown on page 19, has been issued by this board and is to be posted on farms where hogs have been so treated.

Persons living in non-infected territory who wish to have their hogs immunized by the serum-virus method, can do so only after receiving special permission from the State Live Stock Sanitary Board, Old Capitol, St. Paul. They require him to accept the following agreement:

STATE OF MINNESOTA

Live Stock Sanitary Board

In accordance with the provisions of Sec. 4691, R. L. 1913, you are hereby ordered to isolate on your premises, the following described animals:

.....

located in Section.....; Township of ...., County of.....

hogs vaccinated with hog cholera serum-virus by.....
(Veterinarian's name)

of....., on.....19.....
(Address)

You are hereby forbidden to remove or permit to be removed from the said premises any or all of the above described animals or any article or thing that is likely to convey contagion, and you are required to make complete report to the office of the Live Stock Sanitary Board of any unthrifty condition, sickness or death of the above animals, immediately at the time such condition is discovered.

You are further ordered to keep posted in conspicuous places, quarantine placards furnished by the Live Stock Sanitary Board.

This quarantine remains in force for at least twenty-one days, and until such time as all animals are well and there is no danger of infection, and until all hogs have been properly sprayed or dipped in a 3 per cent solution of liquor cresolis compound or any other disinfectant officially approved by the Federal Bureau of Animal Industry, and the yards, pens and houses have been thoroughly cleaned and then disinfected with a similar preparation, when the quarantine will be released by the Live Stock Sanitary Board or the chairman of the local board of health. Your attention is directed to Sec. 2165, R. L. 1913, which provides that any person violating the quarantine is guilty of a misdemeanor and punishable accordingly.

LIVE STOCK SANITARY BOARD.

Per.....

I (the owner or agent).....
(Name)

....., do hereby agree to abide by the above order of
(Address)
quarantine of the Live Stock Sanitary Board, State of Minnesota.

Signed.....

The Division of Veterinary Medicine at University Farm stands ready to coöperate with any agency within the state toward the control and suppression of hog cholera.

NOTICE

STATE LIVE STOCK SANITARY BOARD

HOG CHOLERA

EXISTS ON THESE PREMISES

Regulation requiring the isolation of domestic animals for certain contagious and infectious diseases. Adopted by the Board and approved by *Deputy Attorney General on May 18th, 1920.*

BE IT RESOLVED by the Live Stock Sanitary Board of the State of Minnesota that the following regulation is deemed expedient and necessary for the proper protection of the domestic animals of the State of Minnesota, and be it further resolved that pursuant to the authority granted by the provisions of Section 4691 the following rule and regulation be and the same is hereby adopted, to-wit:

The owner or person in charge of any domestic animal affected with or which shows symptoms of, or has been exposed to the following diseases: glanders, tuberculosis, actinomycosis (lumpy jaw), infectious anaemia (swamp fever), anthrax scabies, hog cholera, necro bacillosis, epizootic lymphangitis, black leg. foot and mouth disease, and Texas fever, shall forthwith upon discovery of the existence of such disease or symptoms thereof or upon ascertainment that any such animal has been exposed to any of said diseases, cause each and every animal so affected, exposed or showing symptoms of the existence of such disease to be isolated from all other well or unexposed domestic animals and to thereafter continue to have each such animal isolated, as aforesaid, on the premises of the owner of such animal or of the person in charge thereof until such time as the State Live Stock Sanitary Board, its executive officer or a duly authorized agent or officer of said board, shall certify in writing that such animal is free from any such disease, or that there is no longer any reasonable necessity to keep such animal isolated from other domestic animals.

It shall be the duty of local health officers when directed so to do by the executive officer of the Live Stock Sanitary Board or any officer or agent thereof, to place in a conspicuous place, or places on the premises where any such animal may be isolated, as aforesaid, a placard or notice of the existence of such disease. No person except the owner, attendants or medical advisers shall enter any enclosure where any animal so isolated is being kept and upon which a placard shall have been placed, as hereinbefore provided for, during the time such placard is so displayed. No person shall remove, obliterate, mutilate or destroy any such placard so posted until the executive officer or a duly authorized agent or officer of the Live Stock Sanitary Board shall have certified in writing that said isolated animal or animals referred to in the placard, are free from the disease specified in such placard, or that there is no longer any reasonable necessity of keeping the animal or animals referred to in the placard isolated from other domestic animals.

SECTION 4701, STAT. 1913

Provides that every person violating any rule or regulation made by the Live Stock Sanitary Board shall be guilty of a misdemeanor, the minimum puishment whereof shall be a fine of $25.00 or imprisonment for 30 days. Said section also provides that any member of a local Board of Health who shall neglect or refuse to perform any duty imposed upon him by law or by the direction of the State Live Stock Sanitary Board or who refuses or neglects to enforce the regulations of said State Board shall be guilty of a misdemeanor, the punishment whereof shall be a fine of $25.00.

Fig. 13. Poster to Be Displayed when Hog Cholera Exists on the Premises

STATE LIVE STOCK SANITARY BOARD

HOGS QUARANTINED

All persons, excepting the owner, duly authorized attendants, or medical advisers. are forbidden to enter any enclosures where hogs are kept on these premises, until this card has been removed by permission from the State Live Stock Sanitary Board. or Local Board of Health.

Persons living on this place must not go near pens or yards where hogs are kept on other farms.

Hogs must not be removed from these premises.

Keepers of these hogs will be held responsible for the unauthorized removal of this notice. and for allowing any swine hereby quarantined to escape from these pens or yards and run at large.

By order of

Dated.. . ...19..... . . ..Health Officer.

CHAPTER 352. LAWS OF 1913.

Sec. 21. Any person violating any provision of this act or any rule or regulation made by the State Live Stock Sanitary Board. or by any Local Board of Health, or any order made by such board under the authority hereof. shall be guilty of a misdemeanor and be punished by a fine of not less than twenty-five (25) or more than one hundred (100) dollars. or by imprisonment for not less than thirty (30) or more than ninety (90) days.

Fig. 14. Poster to Be Displayed when Hogs Have Been Treated with Serum-Virus